DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 31 Mar 2008 has been entered.

This Office Action is responsive to Applicant's Amendment and Remarks, filed 31 Mar 2008, in which claims 1 and 12 have been amended to change the scope and breadth of the claim, claim 14 is canceled, and new claim 15 is added.

The instant application is the national stage entry of PCT/EP03/02910, filed 20 Mar 2003; and claims benefit of foreign priority document EPO 02425172.0, filed 20 Mar 2002.

Claims 1-8, 10-13 and 15 are pending.

Rejections Withdrawn

Applicant's Amendment, filed 31 Mar 2008, with respect to the rejection of claims 1-5, 10, 11, and 13 under 35 U.S.C. 102(b) as being anticipated by Ward et al. (Surface Science, 1978, p257-273, of record) has been fully considered and found to be

persuasive to remove the rejection as claim 1 has been amended to include the limitation "the amount of functional groups introduced in the polysaccharide is between 10^{-3} and 2 mol olefin/eq anhydrous glucose" and dependent claims 2-5, 10, 11, and 13 incorporate the limitation therein.

Therefore the previously stated rejection is **withdrawn**.

Applicant's Amendment, filed 31 Mar 2008, with respect to the rejection of claims 1 and 4-6 under 35 U.S.C. 103(a) as being unpatentable over Ward et al. (Surface Science, 1978, p257-273, of record) in view of Demott (US patent 3,558,596, issued 26 Jan 1971, of record) has been fully considered and found to be persuasive to remove the rejection as claim 1 has been amended to include the limitation "the amount of functional groups introduced in the polysaccharide is between 10^{-3} and 2 mol olefin/eq anhydrous glucose" and dependent claims 4-6 incorporate the limitation therein.

Therefore the previously stated rejection is **withdrawn**.

Applicant's Amendment, filed 31 Mar 2008, with respect to the rejection of claims 1-4 and 7-8 under 35 U.S.C. 103(a) as being unpatentable over Burke et al. (Canadian Patent CA 2,249,955, of record) in view of Krassig (Sven Papperstidn, 1971, p417-428, of record) has been fully considered and found to be persuasive to remove the rejection as claim 1 has been amended to include the limitation "the amount of functional groups introduced in the polysaccharide is between 10^{-3} and 2 mol olefin/eq anhydrous glucose" and dependent claims 2-4 and 7-8 incorporate the limitation therein.

Therefore the previously stated rejection is **withdrawn**.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Amended claims 1-6, 10-13 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Kataoka et al. (US Patent 6,187,391, issued 13 Feb 2001, cited in PTO-892) as evidenced by Ward et al. (Surface Science, 1978, p257-273, of record).

Kataoka et al. discloses a method comprising a first step of subjecting a textile fabric with a low-temperature plasma treatment to form an active seed for a graft polymerization reaction, then in a separate second step graft-polymerizing this active seed with a polymerizable monomer (abstract). Kataoka et al. discloses the textile fabric is a blend of fibers including synthetic fibers polyester; polypropylene, a polyolefin; polyamide; and natural fibers including the polysaccharides cotton or flax fibers; and silk (spanning column 3, lines 63-67 and column4, lines 1-2), meeting limitations of instant claims 1 and 4-6. Kataoka et al. discloses the method by using low-temperature plasma treatment to general stable active seeds, or free radicals (column 5, lines 15-25), meeting limitations of instant claims 1-3 and 13. Kataoka et al. discloses the method comprising a second step in which the surface of the textile fabric or the nonwoven fabric having the active seed as obtained in the first step is contacted

with the radical-polymerizable monomer to conduct graft polymerization (column 5, lines 48-51), wherein the monomer is a functionalized olefin such as acrylic acid (column 6, lines 37-38), meeting limitations of instant claim 1 and 13. Kataoka et al. discloses the monomer added to the textile to the amount between 0.3 % by weight and 2.0% by weight (column 7, lines 18-24). For the monomer acrylic acid (MW = 72.06 g/mol), this is equal to 0.0075 - 0.05 mol acrylic acid / eq anhydrous glucose, or $7.3 \times 10^{-3} - 5 \times 10^{-2}$ mol olefin / eq anhydrous glucose, from the calculations:

1.00 g cotton = 0.00556 mol eq anhydrous glucose

0.003 - 0.02 g acrylic acid = 0.000041667 - 0.0002778 mol acrylic acid

(0.000041667 - 0.0002778 mol acrylic acid) / 0.00556 mol eq anhydrous glucose

= 0.0075 - 0.05 mol acrylic acid / eq anhydrous glucose

The range $7.3 \times 10^{-3} - 5 \times 10^{-2}$ mol olefin / eq anhydrous glucose disclosed by Kataoka et al. meets the limitations of the range in instant claims 1. The value of 5×10^{-2} mol olefin / eq anhydrous glucose disclosed by Kataoka et al. meets the limitations of the range in instant claims 12 and 15. Kataoka et al. discloses the textile made by this process, meeting the limitations of instant claims 11 and 12.

Karaoka et al. discloses, “The thus-obtained active seed is one which is stable for a long period of time.” (column 5, lines 21-22). However, Karaoka et al. is silent as to the specific half-life of the active seed, or free radical. Ward et al. provides evidence that a stable radical generated by the use of cold plasma to generate free radical active centers within the cellulose matrix of cotton cellulose has a half-life of about 1 day, “the singlet remains even after 24 h exposure to room atmosphere, showing that the radical

is long-lived." (Ward et al., page 266, lines 6-9). Therefore it is apparent from what is disclosed that the method disclosed by Karaoka et al. necessarily generates a free radical with a a half-life of about 1 day, inherently meeting the limitations of instant claim 10.

Amended claims 1-5 and 11-13 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Zara et al. (Tappi Journal, 1995, p131-134, cited in PTO-892). Zara et al. disclose pulp cellulose fiber forms free radicals generated Fe2+/H2O2, Fenton's reagent, which is followed by the addition of vinyl acetate, a functionalized olefin. See Zara et al., page 131, left column, lines 20-23 and middle column, lines 13-18 and page 134, middle column, lines 31-33 and 39-41. Zara et al. disclose the grafting of cellulose pulp used in the paper industry, wherein the cellulose pulp fibers are used together with other cellulose pulp fibers to make paper. See Zara et al., page 131, middle column, lines 3-6. The radical is formed by consumption of the Fe2+/H2O2 reagent that is the radical initiator, to "create active centers by abstracting an active hydrogen from the backbone polymer chain" which may be propagated by growing poly(vinyl)acetate radicals, such that the propagated free-radical reaction occurs in the absence of the consumed Fe^{2+}/H_2O_2 radical source. See Zara et al., page 133, left column, lines 5-10 and center column, lines 4-7. Zara et al. further disclose the cellulose graft polymer produced by these methods at different amounts of monomer grafted onto the cellulose backbone as data points plotted on graphs. See, for example, Zara et al., page 132, figures 1, 2, 3, and 4. The G% along the vertical axis of the

graphs in the figures is calculated by the formula on page 134 right column, lines 4-9, G% = [(M2-M1)]/M1 * 100%, where M2 is the mass of the graft polymer product and M1 is the mass of cellulose. A G% of 100 corresponds to a ratio mol olefin/eq anhydrous glucose of approximately 1. Data points corresponding with individual polymers with this G% value are present in figures 2, 3 and 4, anticipating the range of ratios mol olefin/eq anhydrous glucose in the instant application.

Response to Applicant's Remarks:

Applicant's remarks, filed 31 Mar 2008, with respect to the above ground of rejection, has been fully considered and not found to be persuasive to remove the rejection.

Applicant again asserts that Zara et al. does not disclose a separate production of radicals and polymerization step. However, the method of instant claim 1 recites "comprising: a first step, wherein a free radical on a polysaccharide chain is formed, and a second step, wherein said radical reacts with an olefin in the absence of a radical source". Claim 1 does not recite a separate production of radicals and polymerization step, but a second step in which the radical reacts with an olefin in the absence of a radical **source**. It is well-known in the art that radical reactions occur via a free radical chain reaction, comprising 1) a initiation step wherein a radical source is consumed to produce a radical, 2) a propagation step wherein radical species different from the radical source react to produce other radicals, and 3) a termination step wherein free radicals are quenched with other free radicals. Zara et al. discloses the chain of reactions in which the free radical source is consumed to create free radicals that

propagate the radical reaction and terminates in the reaction of a free radical on a polysaccharide chain with an olefin. See Zara et al. spanning page 132, right column, lines 6-17 and page 133, left column, lines 1-14. The free radical **source** is interpreted as the **initiator** for the free radical chain reaction, not the propagating species. A claimed embodiment of a radical **source**, disclosed in claim 3, is Fenton's Reagent, Fe^{2+}/H_2O_2. The radical **source** disclosed by Zara et al., Fe^{2+}/H_2O_2, is consumed in the initiation reaction and is no longer present in these propagation reactions. Zara et al. discloses the reaction is run for 50 minutes (page 134, right column, lines 1-3) and discloses no radical source, Fe^{2+}/H_2O_2, remains that would need to be neutralized during isolation of the product. Absent evidence that the reaction disclosed by Zara et al. necessarily immediately ceases upon consumption of the Fe^{2+}/H_2O_2, it is found that at least one polymerization reaction must occur after the point in time when all the Fe^{2+}/H_2O_2 has been consumed, as the last molecule of H_2O_2 consumed generates an OH radical that reacts with cellulose as disclosed in Zara et al., page 133, left column, equation 5. Therefore the reaction disclosed by Zara et al. comprises a first step, wherein a free radical on a polysaccharide chain is formed, and a second step, wherein said radical reacts with an olefin in the absence of a radical **source**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Amended claims 1-3, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kataoka et al. (US Patent 6,187,391, issued 13 Feb 2001, cited in PTO-892) in view of Weil (US Patent 4,017,257, issued 12 Apr 1977, cited in PTO-892).

Kataoka et al. discloses as above.

Kataoka et al. does not specifically disclose the method wherein the free radical is generated by electron beam having a radiation dose between 10 and 400 kGy (instant claim 7) or wherein the radiation dose is between 20 and 200 kGy (instant claim 8).

Weil teaches functionalization of textiles by free radical grafting (column 12, lines 35-46). Weil teaches “radiation encompasses high energy protons and other particles capable of initiating free radical reactions including … beta rays, i.e. electron beam radiation, and plasma…" (column 13, lines 36-40). Weil teaches “in the case of electron

beam radiation, suitable dosages are typically in the range of 0.1-10 megarad" (column 13, lines 50-51), a dose equivalent to the range of 1 to 100 kGy.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method disclosed by Kataoka et al. with the teaching of Weil of generating free radicals using an electron beam with a dose equivalent to 100 kGy. The inventions of Kataoka et al. and Weil are all drawn to the field of functionalization of textiles by generating a free radical. It is *prima facie* obvious to one of ordinary skill in the art to substitute equivalent processes known for the same purpose to substitute the cold plasma disclosed by Kataoka et al. with an electron beam with a dose equivalent to 100 kGy taught by Weil. An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious, see MPEP 2144.06 II.

Conclusion

No claim is found to be allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan S. Lau whose telephone number is 571-270-3531. The examiner can normally be reached on Monday - Thursday, 9 am - 4 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shaojia Anna Jiang can be reached on 571-272-0627. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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